

# PENDORF & CUTLIFF

## ATTORNEYS AT LAW

Patent, Trademark, Copyright, Licensing & Entertainment  
www.patentcentral.com

E-MAIL: pendorf@patentcentral.com  
cutliff@patentcentral.com  
sherri@patentcentral.com

### Tampa Office:

Post Office Box: 20445  
Tampa, Florida 33622-0445  
Phone: (813)886-6085  
Fax: (813)886-6720

Reply To: Tampa Office

### St. Petersburg Office:

501 First Avenue North, Suite 507  
Post Office Box 15095  
St. Petersburg, Florida 33733

Courier Delivery Address:  
3940 Venetian Way  
Tampa, Florida 33634

January 26, 2001

## **BOX PCT**

Honorable Commissioner of  
Patents and Trademarks  
Washington, D.C. 20231

PCT/DE00/01666  
- filed May 24, 2000

Re: Application of Helmut **JORKE**  
"DEVICE FOR PROJECTING A COLOR IMAGE"  
Our Ref.: 3926.018

Dear Sir:

The following documents and fees are submitted herewith in connection with the above application for the purpose of entering the National stage under 35 U.S.C. §371 and in accordance with Chapter I of the Patent Cooperation Treaty:

- ☒ this express request to immediately begin national examination procedures (35 U.S.C. 371(f)).
- ☒ an executed Declaration and Power of Attorney.
- ☒ a German Language International Application with European Search Report
- ☒ an English (translation of the) International Application.
- ☐ an English (translation of) Article 19 claim amendments.
- ☐ English translation of Article 34 amendments (annexes to the IPER) and German language IPER.
- ☐ an executed Assignment and PTO 1595 form.
- ☒ Preliminary Amendment.

It is assumed that copies of the International Application, the International Search Report, the International Preliminary Examination Report, and any Articles 19 and 34

Honorable Commissioner  
Patents and Trademarks  
January 26, 2001

09/744634  
500 PCT/PTO 26 JAN 2001

Attorney Docket: 3926.018

amendments as required by §371(c) will be supplied directly by the International Bureau, but if further copies are needed, the undersigned can easily provide them upon request.

The Government filing fee is calculated as follows:

Total claims ..... 10 - 20 = \_\_\_\_ x \$18 = \$  
Independent Claims ..... 2 - 3 = \_\_\_\_ x \$80 = \$  
Base Fee ..... \$860.00\*

**TOTAL FILING FEE** ..... \$860.00

\* A copy of the European Search Report is attached.

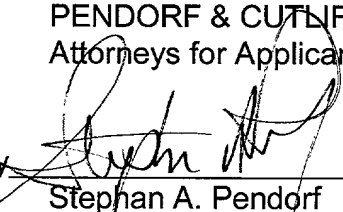
A check for the statutory filing fee of \$860.00 is attached. Please charge or credit any difference or overpayment to Deposit Account No. 16-0877. The Commissioner is hereby authorized to charge any fees under 37 C.F.R. §1.492 which may be required during the entire pendency of the application to said Account.

Priority is claimed from May 26, 1999, based on German Application No. 199 24 167.8.

Respectfully submitted,

PENDORF & CUTLIFF  
Attorneys for Applicant

By

  
Stephan A. Pendorf  
Registration No. 32,665

Honorable Commissioner  
Patents and Trademarks  
January 26, 2001

09/744634  
500 Rec'd PCT/PTO 26 JAN 2001

Attorney Docket: 3926.018

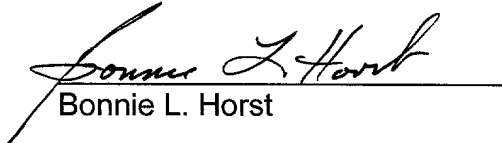
**EXPRESS MAIL CERTIFICATE**

"EXPRESS MAIL" MAILING LABEL NUMBER: **EL568146625US**

DATE OF DEPOSIT: **January 26, 2001**

I HEREBY CERTIFY that the foregoing cover letter including the German Language International Application with European Search Report, English Language translation with Verification Statement, Preliminary Amendment, Declaration and Power of Attorney, payment of fee, and a stamped receipt post card are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. §1.10 on the date indicated and is addressed: **ATTN: Box PCT, Commissioner of Patents and Trademarks, Washington, D.C. 20231.**

The Commissioner is hereby authorized to charge any additional fees which may be required at any time during the prosecution of this application without specific authorization, or credit any overpayment, to Deposit Account Number 16-0877.

  
Bonnie L. Horst

09/744634

500 Rec'd PCT/PTO 26 JAN 2001

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Helmut JORKE

Appln. No.:

Filed: January 26, 2001

For: DEVICE FOR PROJECTING A COLOR IMAGE

Attorney Docket No.: 3926.018

VERIFICATION STATEMENT PURSUANT TO 37 C.F.R. §1.68

Box: PCT

Honorable Commissioner of  
Patents and Trademarks  
Washington, D.C. 20231

Sir:

I, Stephan A. Pendorf, declare and state the following:

I am a citizen of the United States residing at 3940  
Venetian Way, Tampa, Florida;

I have lived in Germany for 14 years and am familiar with  
both the German and English languages and have experience as a  
technical translator;

The attached English-language document is a full, true and  
faithful translation made by me of the text PCT Application No.:  
PCT/DE00/01666.

I hereby declare that all statements made herein of my own  
knowledge are true and that all statements made on information  
and belief are believed to be true; and further that these  
statements were made with the knowledge that willful false  
statements and the like so made are punishable by fine or  
imprisonment, or both, under Section 1001 of Title 18 of the  
United States Code, and that such willful false statements may

09/744634

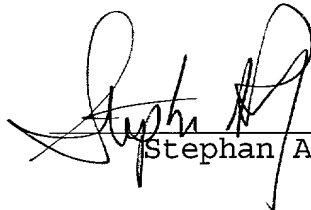
500 PCT/PTO 26 JAN 2001

Patent Application  
Verification Statement

Attorney Docket: 3926.018

jeopardize the validity of this application and of any patent  
issuing thereon.

Date: 1/26/01

  
Stephan A. Pendorf

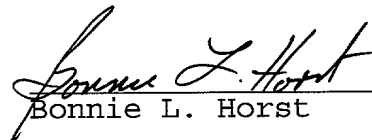
EXPRESS MAIL CERTIFICATE

"EXPRESS MAIL" MAILING LABEL NUMBER: EL568146625US

DATE OF DEPOSIT: January 26, 2001

I HEREBY CERTIFY that the foregoing VERIFICATION STATEMENT  
and a stamped receipt post card are being deposited with the  
United States Postal Service "Express Mail Post Office to  
Addressee" service under 37 C.F.R. §1.10 on the date indicated  
and is addressed: ATTN: Box PCT, Commissioner of Patents and  
Trademarks, Washington, D.C. 20231.

The Commissioner is hereby authorized to charge any  
additional fees which may be required at any time during the  
prosecution of this application without specific authorization,  
or credit any overpayment, to Deposit Account Number 16-0877.

  
Bonnie L. Horst

09/744634

500 Rec'd PCT/PTO 26 JAN 2001

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Helmut JORKE

Appln. No.:

Filed: January 26, 2001

For: DEVICE FOR PROJECTING A COLOR IMAGE

Attorney Docket No.: 3926.018

PRELIMINARY AMENDMENT

Box: PCT

Honorable Commissioner of  
Patents and Trademarks  
Washington, D.C. 20231

Sir:

Prior to examination of the above-identified application,  
please amend the application as follows:

IN THE SPECIFICATION:

Page 1, line 2, insert:

--BACKGROUND OF THE INVENTION

Field of the Invention--

Page 1, line 9, insert:

--Description of the Related Art--;

Page 3, before line 1, insert:

--SUMMARY OF THE INVENTION--

Page 4, line 29, insert:

--BRIEF DESCRIPTION OF THE DRAWINGS;

Fig. 1 is a standard color chart or (x,y)-chromaticity diagram  
wherein the principle colors form a triangle.

Fig. 2 shows an image recording system.

Fig. 3 shows the transmission and reflection characteristics of the dichroic mirror D1 of the image recording system of Fig. 2.

Fig. 4 shows a device for projection of a color image

Fig. 5 shows the transmission and reflection characteristic of the dichroic mirror D2 contained in beam integrator SV of the device of Fig. 4.

Fig. 6 shows the larger color space that can be represented using the device of Fig. 4.

Figs. 7a and 7b show the transmission characteristics of left and right interference filters (IF1) and (IF2) for a pair of glasses (B) through which an observer can obtain the impression of a three dimensional image.

**DETAILED DESCRIPTION OF THE INVENTION--.**

**IN THE CLAIMS:**

Page 8, line 1, please delete "PATENT CLAIMS" and insert therefore --What is Claimed is:--

Please amend the claims as follows:

1. (Amended) A device [Device] for projecting a color image upon a screen (S) including  
a projection lamp (PL) for emission of a radiation spectrum,  
a beam splitter (ST2) for separation of the radiation

spectrum emitted from the projection lamp into a first partial light bundle (B1, G1, R1) and a second partial light bundle (B2, G2, R2) complimentary to the first part light bundle (B1, G1, R1),

two color image modulators (FM1, FM2) for recording and reproducing the partial light bundles (B1, G1, R1, B2, G2, R2), [wherein after the color image modulators (FM1, FM2)]

a beam integrator (SV) is provided subsequent to the color image modulators (FM1, FM2) for reuniting the first partial light bundle (B1, G1, R1) with the second partial light bundle (B2, G2, R2), and [as well as]

a lens system (Ob) for output of the therefrom resulting color image.

2. (Amended) A device [Device] according to Claim 1, wherein the beam splitter (ST2) includes a splitter [first] dichroic mirror (D1) with triple band pass characteristic.

3. (Amended) A device [Device] according to Claim 1 [or 2], wherein the beam integrator (SV) includes [a second] an integrator dichroic mirror (D2) with triple band characteristic.

4. (Amended) A device [Device] according to [one of] Claim[s] 1 [through 3], wherein the two color modulators (FM1, FM2) form a stereo camera.

5. (Amended) A device [Device] according to [one of] Claim[s] 1 [through 4], wherein the first partial light bundle is comprised of three first narrow transmission ranges (B1, G1, R1) and the second partial light bundle is comprised of three second narrow transmission ranges (B2, G2, R2) complimentary to the first



U.S. Application  
PRELIMINARY AMENDMENT

Attorney Docket: 3926.018

transmission ranges, wherein the transmission ranges (B1, G1, R1, B2, G2, R2) lie within the wavelength ranges of the blue, green and red receptors.

6. (Amended) A device [Device] according to [one of] Claim[s] 1 [through 5], wherein the beam splitter (ST2) includes at least one splitter mirror.

7. (Amended) A device [Device] according to [one of] Claim[s] 1 [through 6], wherein the beam integrator (SV) includes at least one integrator [further] mirror.

8. (Amended) A device [Device] according to one of Claims 1 through 7, further including a pair of glasses (B) with interference filters (IF1, IF2) which provide different transmission characteristics for the left eye and the right eye, which produce for the left eye a half image with the first transmission range (B1, G1, R1) and for the right eye a further half image with the second transmission range (B2, G2, R2) for stereoscopic vision.

Please add the following new claims:

--9. A device for recording a color image of an object, the device comprised of

a first camera (K1);

a second camera (K2);

a beam splitter (ST1) placed between said object and said cameras (K1, K2), said beam splitter comprising mirrors (S1, S2, S3) and a dichroic mirror (D1) with a transmission and reflection characteristic such that light from said object being recorded

impinging upon (D1) is spectrally separated into two partial light bundles, wherein the first partial light bundle is comprised of three first narrow transmission ranges (B1, G1, R1) and the second partial light bundle is comprised of three second narrow transmission ranges (B2, G2, R2) complimentary to the first transmission ranges, wherein the transmission ranges (B1, G1, R1, B2, G2, R2) lie within the wavelength ranges of the blue, green and red receptors.

10. A device as in claim 9, wherein the beam splitter spectrally separates the light from the object being recorded into two partial light bundles, wherein

one bundle has a component within the wavelength range 435 - 455 nm and the other has a component within the wavelength range 460 - 480 nm,

one bundle has a component within the wavelength range 510 - 530 nm and the other has a component within the wavelength range 535 - 555 nm, and

one bundle has a component within the wavelength range 600 - 620 nm and the other has a component within the wavelength range 625 - 645 nm.--

#### REMARKS

The specification and claims have been amended to conform the original translated specification and claims to U.S. requirements, i.e., appropriate section headers are added, reference in the specification to the claims have been amended in order to eliminate multiple dependent claims and claims improperly depending from multiple dependent claims, and to otherwise conform the claims to U.S. practice. Care has been taken to ensure that no new matter is added to the text.

09/744634

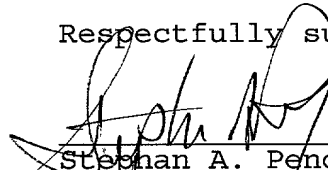
500 Rec'd PCT/PTO 26 JAN 2001

U.S. Application  
PRELIMINARY AMENDMENT

Attorney Docket: 3926.018

Entry and favorable consideration prior to consideration are respectfully requested.

Respectfully submitted,

  
Stephan A. Pendorf  
Registration No. 32,665

PENDORF & CUTLIFF  
P.O. Box 20445  
Tampa, Florida 33622-0445  
(813) 886-6085

Date: January 26, 2001

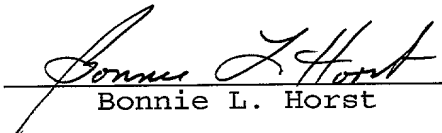
EXPRESS MAIL CERTIFICATE

"EXPRESS MAIL" MAILING LABEL NUMBER: EL5681466250US

DATE OF DEPOSIT: January 26, 2001

I HEREBY CERTIFY that the foregoing PRELIMINARY AMENDMENT is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated and is addressed: **ATTN: BOX PCT, Commissioner of Patents and Trademarks, Washington, D.C. 20231.**

The Commissioner is hereby authorized to charge any additional fees which may be required at any time during the prosecution of this application without specific authorization, or credit any overpayment, to Deposit Account Number 16-0877.

  
Bonnie L. Horst

7/PRB

09/744634

5 Rec'd PCT/PTO 26 JAN 2001

# DEVICE FOR PROJECTING A COLOR IMAGE

The invention concerns a device for projecting a color image onto a screen, the device enabling color image recording and a color image reproduction with greater fidelity than possible with existing techniques. In an alternative embodiment, the device and the therewith employed process provides for full color stereoscopic image reproduction.

In existing devices and processes for image recording in full color, the color information is detected by the separate recording of the respective spectral regions which correspond to the primary colors red, green and blue. In the subsequent image reproduction, the primary color partial pictures are combined into a full color image. A device of this type is known for example from WO W098/49837.

Fundamentally, both in photochemical processes as well as in electronic processes, photoelectric transformers are involved in reproducing visual contents in color.

The length and the breadth of the mentioned spectral regions is largely dictated by the spectral sensitivity of the color receptors in the human eye. Typical values for both image recording as well as image reproduction lie in the wavelengths of

spectral region blue	430 - 480 nm
spectral region green	500 - 550 nm
spectral region red	600 - 650 nm

Each of these spectral regions can, via its color coordinates, be assigned a point on the standard color chart ((x,y)-chromaticity diagram) according to DIN 6164 (Mutze et al., ABC of Optics, published by Dausien, Hanau, 1972). The totality of all of these principle colors defined in this manner - the primary valences

- 1 -

EXPRESS MAIL LABEL NO. EL 56814662545  
I HEREBY CERTIFY THAT THIS PAPER IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE EXPRESS MAIL POST OFFICE TO ADDRESSEE SERVICE UNDER 37 CFR 1.10 IN AN ENVELOPE ADDRESSED TO THE COMMISSIONER OF PATENTS AND TRADEMARKS, WASHINGTON, D.C. 20231, ON THIS DATE. THE COMMISSIONER IS HEREBY AUTHORIZED TO CHARGE ANY FEES ARISING HEREFROM AT ANY TIME TO DEPOSIT ACCOUNT 16-0877.

1-26-01  
DATE

James L. Horst  
SIGNATURE

(reference stimulus) (see USP 4,409,614, incorporated herein by reference) - form a triangle in the standard color chart, as shown in Fig. 1 (continuous line). By an additive color mixing of the basic colors, each color can be represented within this triangle. Colors outside of this triangle cannot be represented. In particular, spectrally pure colors with their characteristic high color saturation - these lying on the outlying peripheral curve, the spectral color chart curve - are not reproducible.

One possibility for enlarging the representable color space is comprised in the selection of primary valences with narrower spectral ranges for image reproduction. In the extreme case the primary valences (primary colors) are finally spectrally pure and lie on the spectral color curve, as shown in Fig. 1 (dashed line). However the price for the thus achieved enlargement of the color space, for example in projection systems which use broad band emitting temperature radiators (bodies that deliver radiant heat, whose frequency (color) depends on the temperature, commonly used as wide-band strong sources of light) as projection lamps, is a substantial loss in image intensity. This becomes more distinct with the narrowing of the bandwidth of the base colors, since out of the entire emission spectrum only correspondingly small emission ranges are utilized.

If on the other hand one employs spectrally pure light sources, such as for example lasers, then this disadvantage does not occur. However, such systems are very complex and expensive. Besides this, the enlarging of the color space does not necessarily result in increased color reproduction fidelity. Rather, calculations must be made on the enlarged color reproduction side as well as on the recording side. Otherwise, there could result false colors which must be corrected using suitable color transformers. The later however results again in a reduction in the size of the color space.

The invention is thus concerned with the task of providing a device for projection of a color image, which makes it possible not only to produce an enlarged color space, but rather also to reproduce it, wherein on the recording side the calculation is carried out relative to the reproduction side enlarged color space, wherein there is no substantial loss or penalty in image brightness, wherein the emitted light of the projection lamp is utilized in an efficient manner and wherein expensive spectrally pure light sources are not required.

It has been found that an alternative embodiment of the device can be employed for recording and reproducing three dimensional images. The device offers the advantage, that with few manipulative steps it is possible to alternate between the mode "image recording and reproducing with enhanced color reproduction faithfulness" and the mode "three dimensional recording and reproduction".

By the use of the device, a process for recording and reproducing color images is realized, in which during image recording of the recording object (target) two color images are recorded in parallel, wherein for the image reproduction a projection process is employed, wherein light from a single projection lamp is divided into multiple partial light bundles via a first dichroic mirror with triple band pass characteristic. The three transmission ranges B1, G1, R1 of the first dichroic mirror lie within the wavelength range for a dominant excitation of the blue, green and red receptors in the human eye. One of the transmitted partial light bundles is directed through a color image modulator, which contains the image information from the one recorded color image. Another mirrored partial light bundle is directed through a further color image modulator, which obtains the color image information from the other recorded color image. The two partial light bundles are, after their modulation, again reunited into one light bundle via a second

dichroic mirror with triple band pass characteristic. The second dichroic mirror exhibits three transparent or transmissive ranges B2, G2 and R2, which are within the wavelength range for a dominant excitation of the blue, green and red receptors in the human eye and which lie outside the transmission ranges B1, G1, R1 of the first dichroic mirror. Beam recombination occurs in the manner, that the partial light bundle transmitted through the first dichroic mirror is reflected at the second dichroic mirror.

The two color images are recorded in such a manner, that light from the object being recorded is first split preferably by a dichroic mirror with three transmissive ranges B1, G1, R1. The transmitted partial light bundle serves for recording the one color image. The reflected partial light bundle serves for recording the other color image. The two color images are recorded by a stereo camera. The dichroic mirror with the transmission ranges B1, G1, R1 is preferably integrated in a beam splitter which is provided as an enclosed construction component in front of the lenses of the stereo camera. For image reproduction the observer preferably wears a pair of glasses, which have in front of one eye an interference filter with transmission ranges B1, G1, R1 and in front of the other eye an interference filter with the transmission ranges B2, G2, R2. Thereby the left eye exclusively receives the color image recorded with the left camera lens and the right eye exclusively color image recorded with the right camera lens, whereby a stereoscopic vision with a particularly good color fidelity and saturation is produced.

The invention will be described in the following on the basis of two illustrative embodiments which reference to the schematic drawings.

Fig. 2 shows an image recording system, comprised of a camera K1 and an camera K2 with a beam splitter ST1 placed before it, which

is a single construction component comprised of the mirrors S1, S2, S3 and a dichroic mirror D1 with a transmission and reflection characteristic as shown in Fig. 3. The light from the object being recorded impinging upon D1 is spectrally separated into two partial light bundles. The partial light bundle passing through mirrors S2 and S3 into camera K1 is comprised spectrally of three components B1, G1, R1, which for example cover the wavelength ranges

B1	435 - 455 nm
G1	510 - 530 nm
R1	600 - 620 nm

The partial light bundle entering into camera K2 via mirror S1 is comprised of the spectrum complimentary to light bundle 1.

Fig. 4 shows a device for projection of a color image (also called image reproduction system), comprised of a projection lamp PL with a temperature radiator, which emits a broad band spectrum, a beam splitter ST2 with basically the same design as beam splitter ST1, two color image modulators FM1 and FM2, which operate for example on the basis of light valve technology, a beam integrator SV with basically the same design as ST1, a projection lens system Ob and a display screen S. The internal construction of color image modulators constitutes a part of the state of the art (G. Derra et al., "UHP-Lamps: Light Sources of Extreme High Light Intensity for the Projection TV", Phys. Letters, 54 (1998, No. 9). The beam integrator SV brings the partial light bundles back together after their modulation in the color image modulators FM1 and FM2. Therein the color image modulator FM1 obtains the image information from camera K1 and the color image modulator FM2 the image information from camera K2. The dichroic mirror D2 contained in beam integrator SV has a transmission and reflection characteristic or relationship as shown in Fig. 5. By means of this transmission and reflection relationship it is achieved that the light bundle emitted from



beam integrator SV is comprised spectrally of six ranges. Besides the spectral ranges B1, G1, R1 there is also within its spectrum the components B2, G2, R2, which can cover for example the following wavelength ranges

5

B2	460 - 480 nm
G2	535 - 555 nm
R2	625 - 645 nm

10 The image recording and image reproducing process which can be carried out using this device employs, instead of three - as is conventional in existing processes - six primary valences, which corresponds to the spectral ranges B1, B2, G1, G2, R1, R2. Thereby a larger color space can be represented, as shown in Fig. 15 6. By the spectral partitioning already in the image recording by means of the beam splitter ST2, it is achieved that a larger color space is not only representable by the described process, but rather also is significantly reproducible. For clarification or explanation of this factual relationship it is assumed, that 20 spectrally pure light with  $\lambda = 450$  nm enters into the image recording system (= color modulators FM1, FM2), as shown in Fig. 2. On the basis of the beam splitting in ST1 only the blue spectral range is addressed in camera K1. Accordingly only the light valve for the spectral range blue opens in color modulator 25 FM1 of the image reproducing system according to Fig. 4. After beam integration in the beam integrator SV there is in the spectrum only the primary valences B1, which produces on the display screen S an almost saturated color imprint of the color blue. In the conventional processes with a primary valence blue 30 in the wavelength region

430 - 480 nm

the reproduced color saturation and therewith the true color reproduction would be clearly lower.

In an alternative embodiment the beam splitter ST1 is omitted as  
5 a construction component. Camera K1 and camera K2 form a  
stereoscopic image pair. In image reproduction according to Fig.  
4 the image information of the left half image recorded by camera  
K1 is contained in the primary valences B1, G1, R1. The image  
information of the right image half is contained in the primary  
10 valences B2, G2, R2. With the aid of a supplemental pair of  
glasses B on the observer, which contain the interference filters  
IF1 and IF2 with a transmission relationship as shown in Fig. 7a  
(IF1) and Fig. 7b (IF2), it is achieved that the left eye of the  
observer receives only the left image half and the right eye only  
15 the right image half. Thereby the observer has the impression of  
a three dimensional image.

It is possible to alternate between the mode of operation of  
image recording with enhanced color reproducibility - as  
20 described in illustrative embodiment 1 - and the mode of  
operation of three dimensional image recording - as described in  
illustrative embodiment 2 - in simple manner by removal or  
introduction of the beam splitter ST1, ST2 as a self contained or  
enclosed construction component. A further possibility is  
25 comprised in simply pivoting mirror S1 and S2 out of the beam  
path.

## Patent Claims

1. Device for projecting a color image upon a screen (S) including a projection lamp (PL) for emission of a radiation spectrum, a beam splitter (ST2) for separation of the radiation spectrum into a first partial light bundle (B1, G1, R1) and a second partial light bundle (B2, G2, R2) complimentary to the first part light bundle (B1, G1, R1), two color image modulators (FM1, FM2) for recording and reproducing the partial light bundles (B1, G1, R1, B2, G2, R2) wherein after the color image modulators (FM1, FM2) a beam integrator (SV) is provided for reuniting the first partial light bundle (B1, G1, R1) with the second partial light bundle (B2, G2, R2) as well as a lens system (Ob) for output of the therefrom resulting color image.
2. Device according to Claim 1, wherein the beam splitter (ST2) includes a first dichroic mirror (D1) with triple band pass characteristic.
3. Device according to Claim 1 or 2, wherein the beam integrator (SV) includes a second dichroic mirror (D2) with triple band characteristic.
4. Device according to one of Claims 1 through 3, wherein the two color modulators (FM1, FM2) are stereo cameras.
5. Device according to one of Claims 1 through 4, wherein the first partial light bundle is comprised of three first narrow transmission ranges (B1, G1, R1) and the second partial light bundle is comprised of three second narrow transmission ranges (B2, G2, R2) complimentary to the first transmission ranges, wherein the transmission ranges (B1, G1, R1, B2, G2, R2) lie within the wavelength ranges of the blue, green and red receptors.

6. Device according to one of Claims 1 through 5, wherein the beam splitter (ST2) includes at least one mirror.

7. Device according to one of Claims 1 through 6, wherein the beam integrator (SV) includes at least one further mirror.

8. Device according to one of Claims 1 through 7, further including a pair of glasses (B) with interference filters (IF1, IF2) which provide different transmission characteristics for the left eye and the right eye, which produce for the left eye a half image with the first transmission range (B1, G1, R1) and for the right eye a further half image with the second transmission range (B2, G2, R2) for stereoscopic vision.

## ABSTRACT

A device for projecting a color image upon a screen, including color image recording and color image reproduction with an enhanced color reproduction trueness in comparison to conventional processes. In the device two images are recorded in parallel, which separately detect the shorter and the longer wavelength parts of the individual principle color spectral regions. In image reproduction six primary valences are produced, which respectively comprise the image information of the shorter and the longer wavelength parts of each of the individual principle color spectral regions. In an alternative embodiment the device produces a full color, stereoscopic image reproduction, in which the three primary valences of the respective shorter wave part encode a stereoscopic half image and the three primary valences of the respective longer wavelength part encode the other stereoscopic half image.

(12) NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES  
PATENTWESENS (PCT) VERÖFFENTLICHTE INTERNATIONALE ANMELDUNG

(19) Weltorganisation für geistiges Eigentum  
Internationales Büro



(43) Internationales Veröffentlichungsdatum  
7. Dezember 2000 (07.12.2000)

PCT

(10) Internationale Veröffentlichungsnummer  
WO 00/74392 A1

(51) Internationale Patentklassifikation<sup>7</sup>: H04N 13/00,  
9/31

(71) Anmelder (für alle Bestimmungsstaaten mit Ausnahme von  
US): DAIMLERCHRYSLER AG [DE/DE]; Epplerstrasse  
225, D-70567 Stuttgart (DE).

(21) Internationales Aktenzeichen: PCT/DE00/01666

(72) Erfinder; und

(22) Internationales Anmeldedatum:  
24. Mai 2000 (24.05.2000)

(75) Erfinder/Anmelder (nur für US): JORKE, Helmut  
[DE/DE]; Böhmenstrasse 7a, D-89547 Gerstetten (DE).

(25) Einreichungssprache: Deutsch

(74) Gemeinsamer Vertreter: DAIMLERCHRYSLER AG;  
FTP/U, Sedanstrasse 10/ Geb. 17, D-89077 Ulm (DE).

(26) Veröffentlichungssprache: Deutsch

(81) Bestimmungsstaaten (national): JP, US.

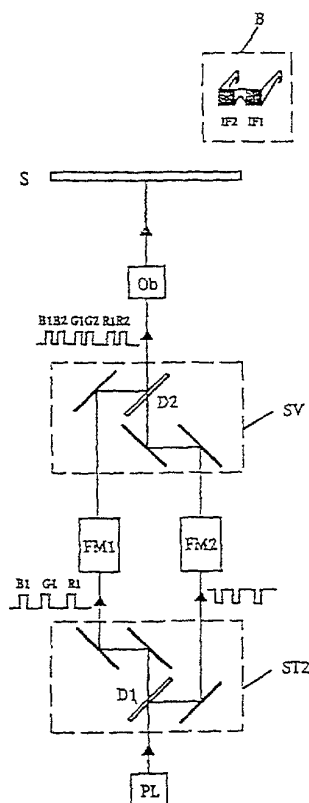
(30) Angaben zur Priorität:  
199 24 167.8 26. Mai 1999 (26.05.1999) DE

(84) Bestimmungsstaaten (regional): europäisches Patent (AT,  
BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,  
NL, PT, SE).

[Fortsetzung auf der nächsten Seite]

(54) Title: DEVICE FOR PROJECTING A COLOUR IMAGE

(54) Bezeichnung: VORRICHTUNG ZUR PROJEKTION EINES FARBBILDS



(57) Abstract: The invention relates to a device for projecting a colour image onto a screen, comprising colour image recording means and colour image reproducing means. The fidelity of the colour reproduction is improved compared to existing techniques. The inventive device records two images that separately cover the short and long wave parts of the individual primary colour spectral regions in parallel. When the image is reproduced, six reference stimuli are generated, each reference stimulus containing the image information for the short- and long-wave part of each primary colour spectral region. The device ensures full colour, stereoscopic image reproduction in a modified form: the three reference stimuli of the respective short wave part codes a stereoscopic frame and the three reference stimuli of the respective long wave part code the other stereoscopic frame.

(57) Zusammenfassung: Die Erfindung betrifft eine Vorrichtung zur Projektion eines Farbbilds auf einen Schirm, umfassend eine Farbbildaufzeichnung und Farbbildwiedergabe mit einer gegenüber bestehenden Verfahren gesteigerten Farbwiedergabetreue. Bei der Vorrichtung werden parallel zwei Bilder aufgezeichnet, die den kürzer- und den längerwelligen Teil der einzelnen Grundfarbenspektralbereiche getrennt erfassen. Bei der Bildwiedergabe werden sechs Primärvalenzen erzeugt, die jeweils die Bildinformation des kürzer- und des längerwelligen Teils jedes einzelnen Grundfarbenspektralbereichs beinhalten. In einer abgewandelten Form gestattet die Vorrichtung eine vollfarbige, stereoskopische Bildwiedergabe, indem die drei Primärvalenzen des jeweils kürzerwelligen Teils das eine stereoskopische Halbbild und die drei Primärvalenzen des jeweils längerwelligen Teils das andere stereoskopische Halbbild codieren.

"EXPRESS MAIL" LABEL NO. **EL56814665US**  
I HEREBY CERTIFY THAT THIS PAPER IS BEING DEPOSITED WITH THE  
UNITED STATES POSTAL SERVICE "EXPRESS MAIL POST OFFICE TO  
ADDRESSEE" SERVICE UNDER 37 CFR 1.10 IN AN ENVELOPE ADDRESSED  
TO THE COMMISSIONER OF PATENTS AND TRADEMARKS, WASHINGTON,  
D.C. 20231, ON THIS DATE. THE COMMISSIONER IS HEREBY AUTHORIZED  
TO CHARGE ANY FEES ARISING HEREFROM AT ANY TIME TO DEPOSIT  
ACCOUNT 16-0877.  
126-01  
DATE SIGNATURE

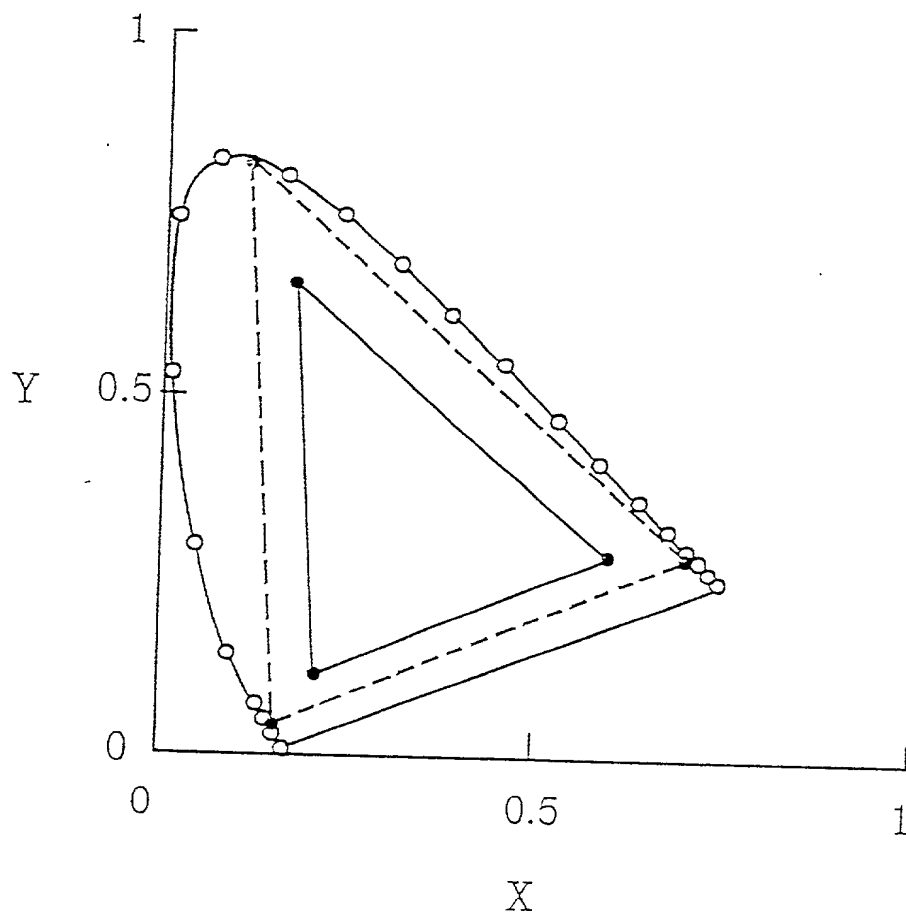


Fig. 1

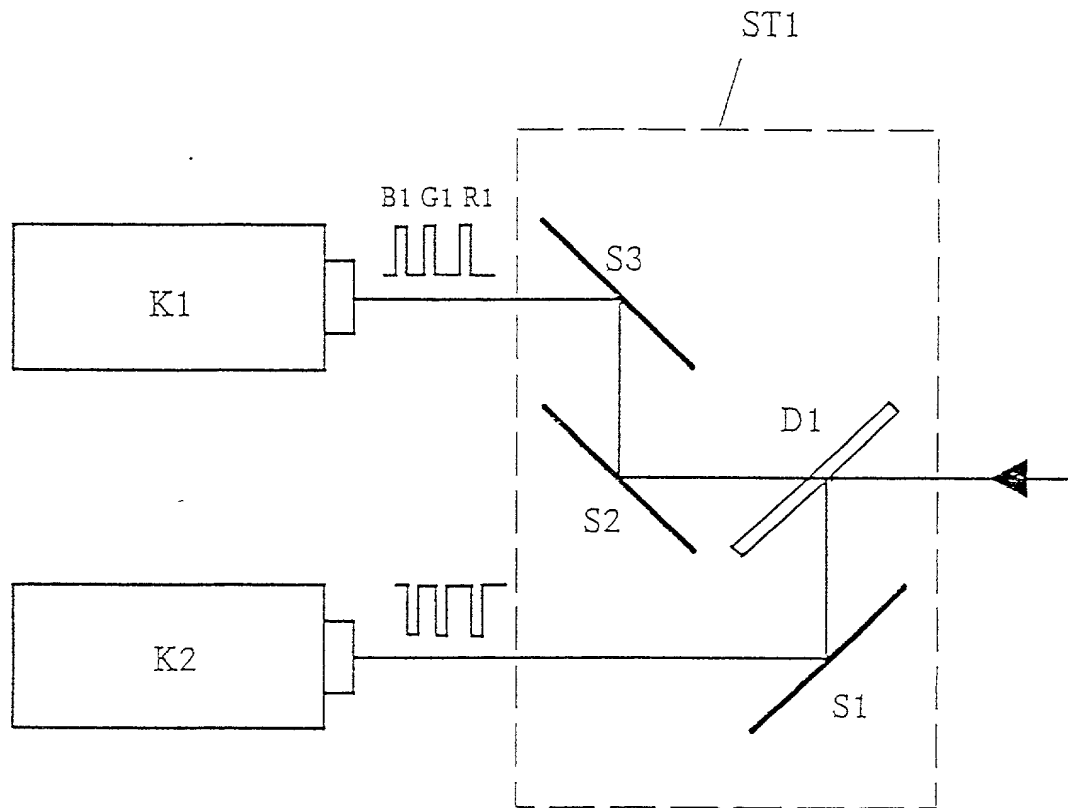


Fig. 2



3 / 7

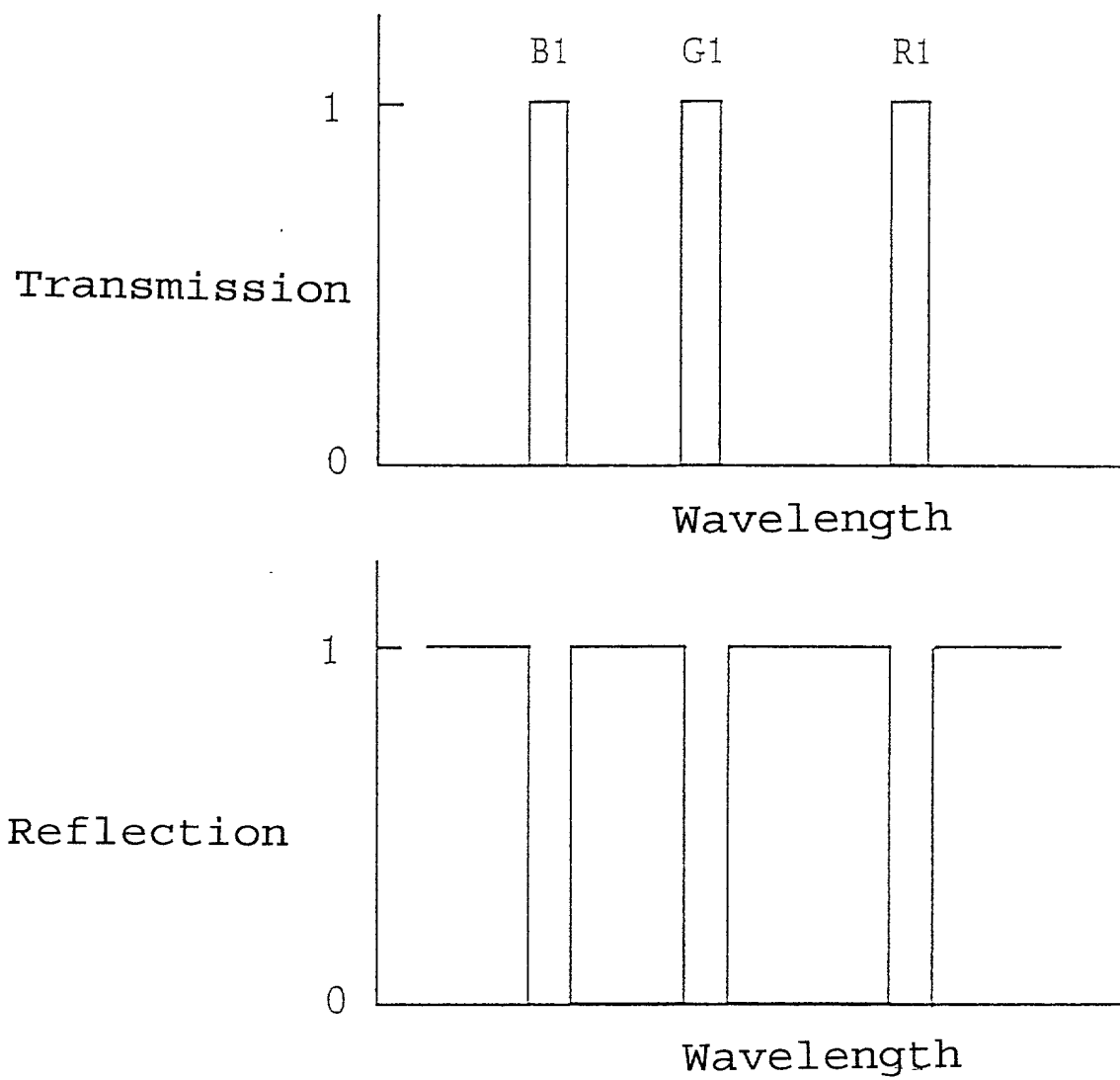


Fig. 3

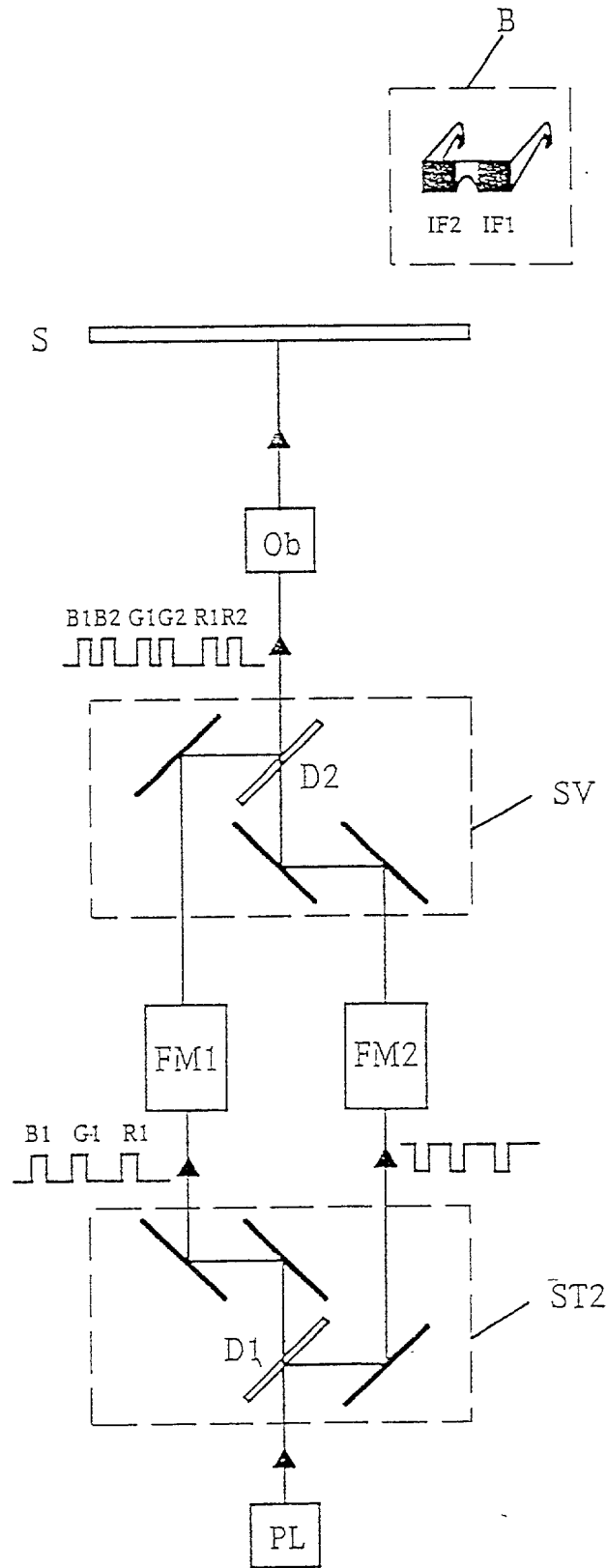


Fig. 4

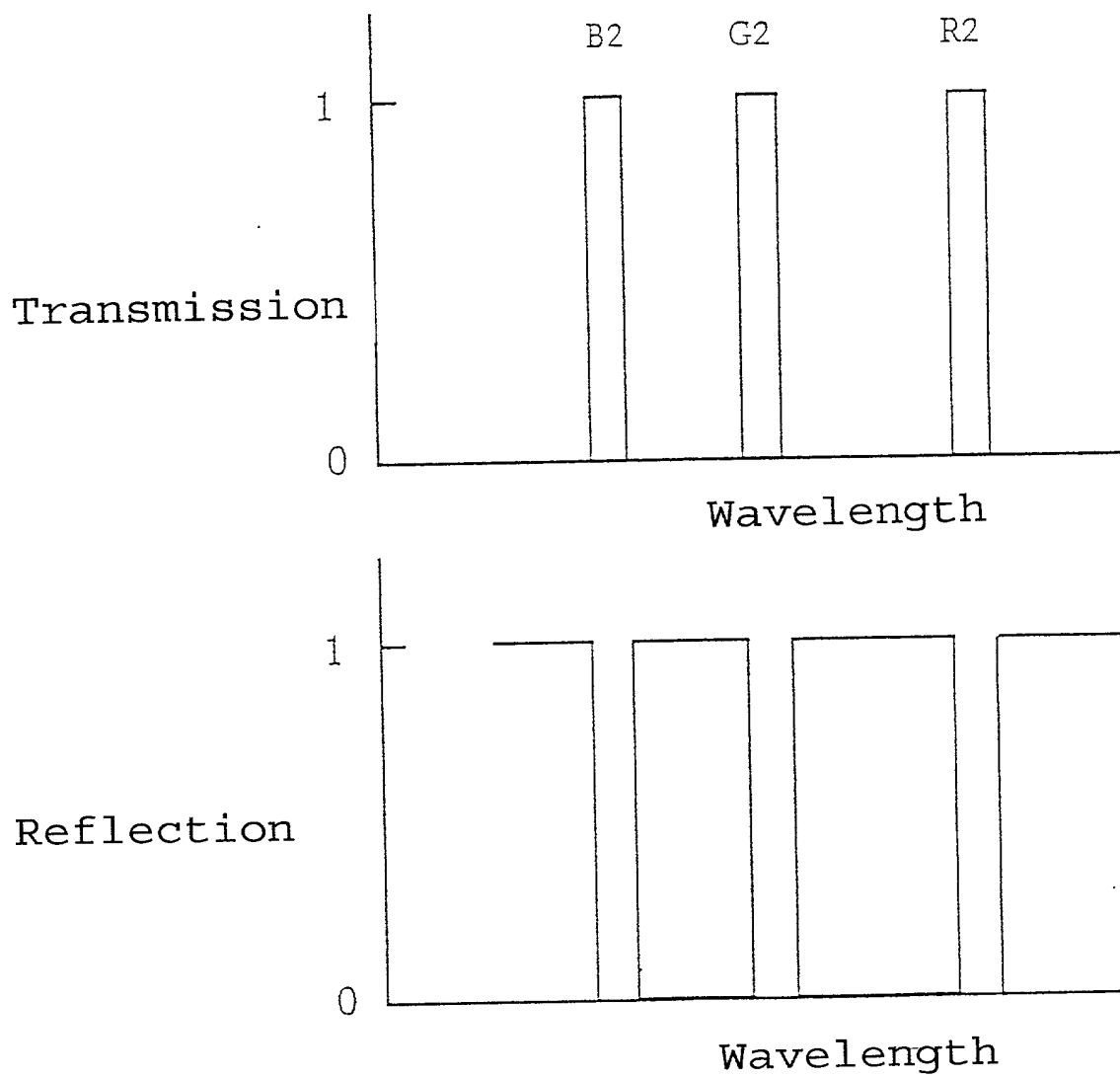


Fig. 5

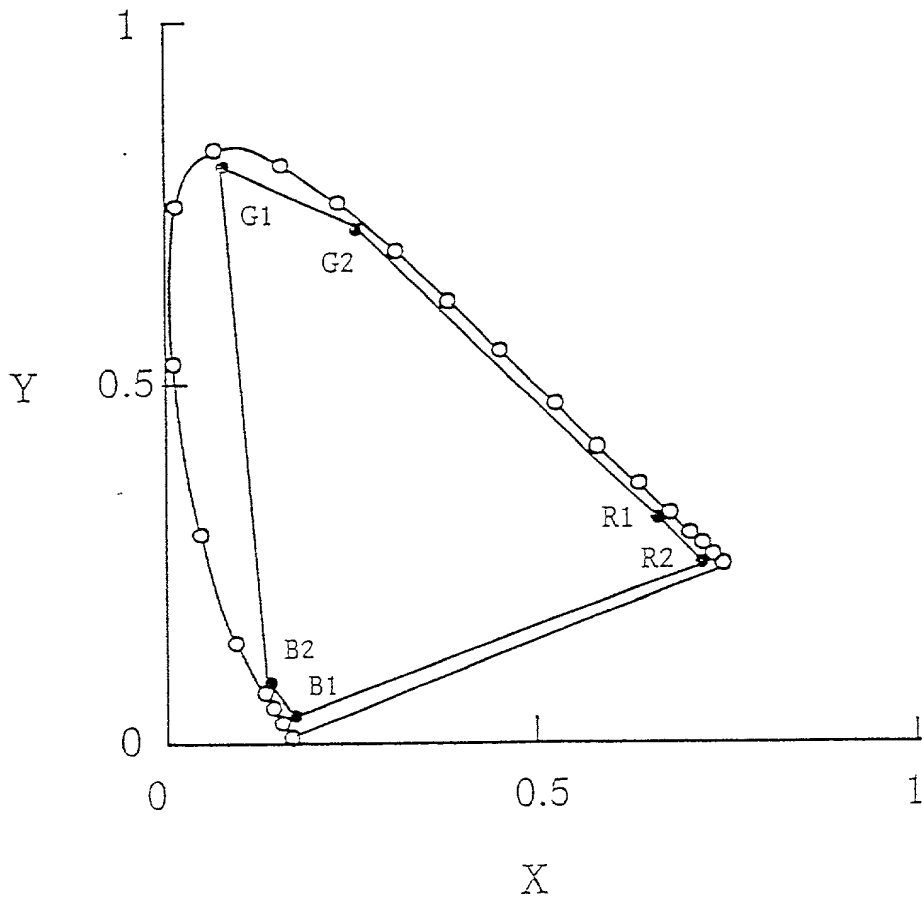


Fig. 6

7/ 7

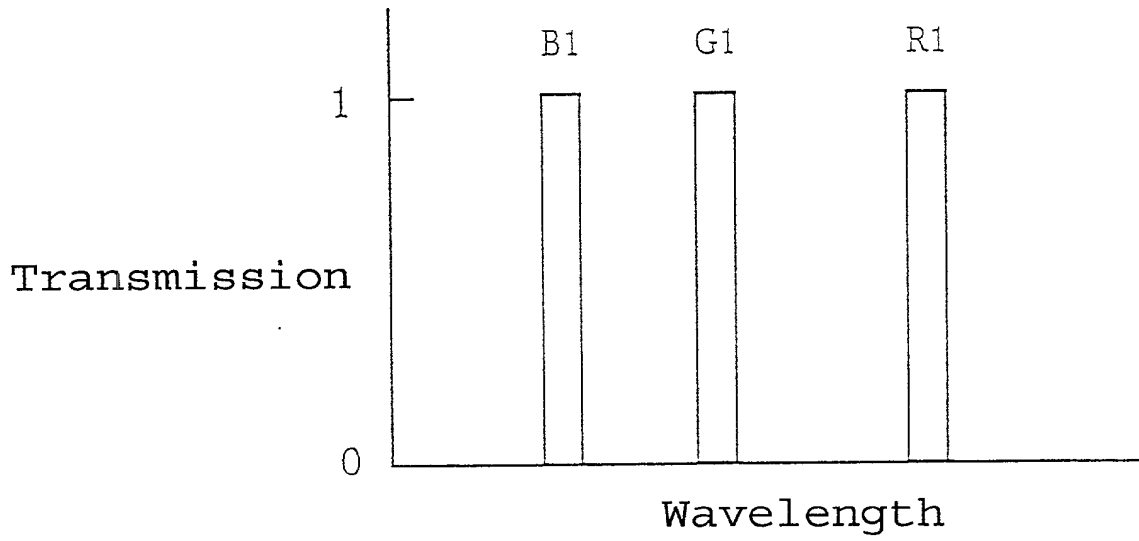


Fig. 7 a

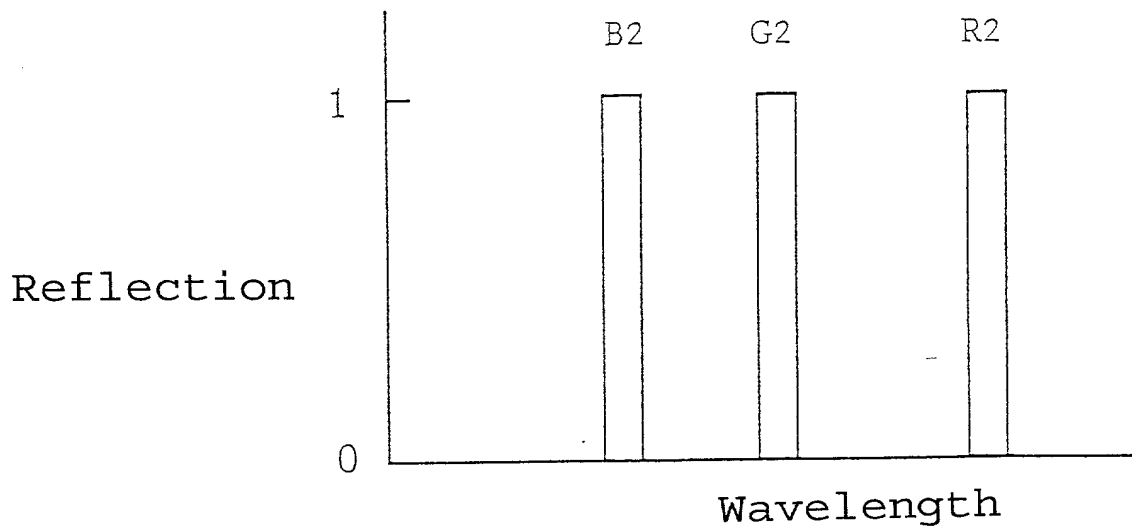


Fig. 7 b

## DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name: that I verily believe I am the original, first and sole inventor (if only one name is listed below) or a joint inventor (if plural names are listed below) of the subject matter claimed and for which a patent is sought in the application entitled:

### DEVICE FOR PROJECTING A COLOR IMAGE

which application is:

☒ the attached application  
(for original application)

Based on Application No. \_\_\_\_\_  
filed \_\_\_\_\_ and amended on \_\_\_\_\_  
(for declaration not accompanying application)

that I have reviewed and understand the contents of the specification of the above-identified application, including the claims, as amended by any amendment referred to above; that I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56; that I hereby claim foreign priority benefits under Title 35, United States Code §119, §172 or §365 of any foreign application(s) for patent or inventor's certificate listed below and have also identified on said list any foreign application for patent or inventor's certificate on this invention having a filing date before that of the application on which priority is claimed:

Application No.	Country	Filing Date	Priority Claimed (yes or no)
19924167.8	Germany	May 26, 1999	yes

I hereby claim the benefit of Title 35, United States Code §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in a listed prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge my duty to disclose any material information under 37 C.F.R. §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

Application No.	Filing Date	Status (patented, pending, abandoned)

I hereby appoint Stephan A. Pendorf, Reg. No. 32,665 and Yaté K. Cutliff, Reg. No. 40,577, my attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith, and request that all correspondence about the application be addressed to Stephan A. Pendorf at Pendorf & Cutliff, P.O. Box 20445, Tampa, FL 33622-0445.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date 15.12.2000

First Inventor Helmut JORKE  
First Name Middle Initial Last Name

Residence same as P.O.

Signature [Signature]

Citizenship German

Post Office Address Boehmenstr. 7a  
D-89547 Gerstetten, GERMANY

EXPRESS MAIL LABEL NO. EL56814662545  
I HEREBY CERTIFY THAT THIS PAPER IS BEING DEPOSITED WITH THE  
UNITED STATES POSTAL SERVICE EXPRESS MAIL POST OFFICE TO  
ADDRESSEE SERVICE UNDER 37 CFR 1.10 IN AN ENVELOPE ADAPTED  
TO THE COMMISSIONER OF PATENTS AND TRADEMARKS, WASHINGTON,  
DC 20540, ON THIS DATE. THE COMMISSIONER IS HEREBY AUTHORIZED  
TO CHARGE ANY FEES ARISING HEREFROM AT ANY TIME TO DEPOSIT  
ACCOUNT 16-0877.  
1-26-01  
DATE [Signature]  
SIGNATURE